DRAINAGE HISTORY OF EASTERN LICKING AND WESTERN MUSKINGUM COUNTIES, OHIO.

A Senior Thesis

by

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Spring, 1987

Approved by

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ABSTRACT

This paper covers the drainage history of the eastern portion of Licking County and the western portion of Muskingum County, Ohio. A summary of the Kansan, Illinoian and Wisconsin glacial influence on the study area is presented.

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INTRODUCTION

This thesis covers the drainage history of the eastern portion of Licking County and the western portion of Muskingum County, Ohio (Figure 1.). The area of study owes its uniqueness to the great glaciations which entered Ohio's borders.

The first ice sheet to enter Ohio was the Kansan (700,000 y.a.), followed by the Illinioan (125,000 y.a.) and Wisconsin (28,000 - 48,000 y.a.) (Goldthwait, 1987).

The Kansan, Illinoian, and Wisconsin ice sheets each had a direct or indirect influence on this area. Changes in the drainage of the area and changes in its topography via aggradation and degradation accompanied their appearances. Prior to the Kansan ice sheet's arrival, eastern Licking County and western Muskingum County were drained by tributraries to the Teays River (Stout et. al., 1943).

Teays System Drainage

The area of study was drained by one of the Teays' longer tributaries, the Cambridge River. The Cambridge River flowed from its headwaters in Coshocton and Guernsey Counties, through Muskingum County, southwesterly to a confluence at Newark with the Groveport River (Figure 2.). The Groveport River collected much of the drainage of Licking, Muskingum, Coshocton and Guernsey Counties.

Putnam Creek was a north-flowing tributary to the Cambridge River and drained the southern portion of Muskingum County into the Cambridge River near Nashport (Stout et. al., 1943).

Figure 1. Area Of Study

Figure 2. Teays Stage Drainage (Stout, et. al.,1943)

**********Drainage divide**********

The Kansan ice sheet caused the first disruption of Ohio's natural drainage and brought about changes within the study area. The recession of that sheet allowed a regional uplift to take place and thus inaugurated the Deep Stage drainage.

Deep Stage Drainage

The Kansan ice sheet brought an end to the Teays drainage system. The damming of the Teays River and its tributaries into finger lakes, and the resultant deposition of lacustrine silts into these lakes, caused many of Ohio's streams and rivers to change course. The damming also allowed for the inauguration of new streams and rivers. The largest new waterway created was the Newark River.

The Newark River originated at the southern border of the ice sheet in Carroll County (Figure 3.). The river extended southwesterly through the study area to Circleville. At Circleville, the River turned southward to meet up with the Cincinnati/Pomeroy River at Portsmouth. This new waterway drained much of the area previously drained by the Groveport/Cambridge tributaries of the Teays River.

The Newark River passed through Muskingum and Licking Counties along the old Cambridge River valley. The Newark River drained a larger area than the Cambridge River had drained because glacial damming added the waters of Tuscarawas, Carroll and Harrison Counties to its drainage basin (Stout et. al, 1943.). Besides the appearance of the Newark River, the study area experienced another change - Putnam Creek ceased to exist.

The Putnam Creek drainage basin was taken over by Dresden

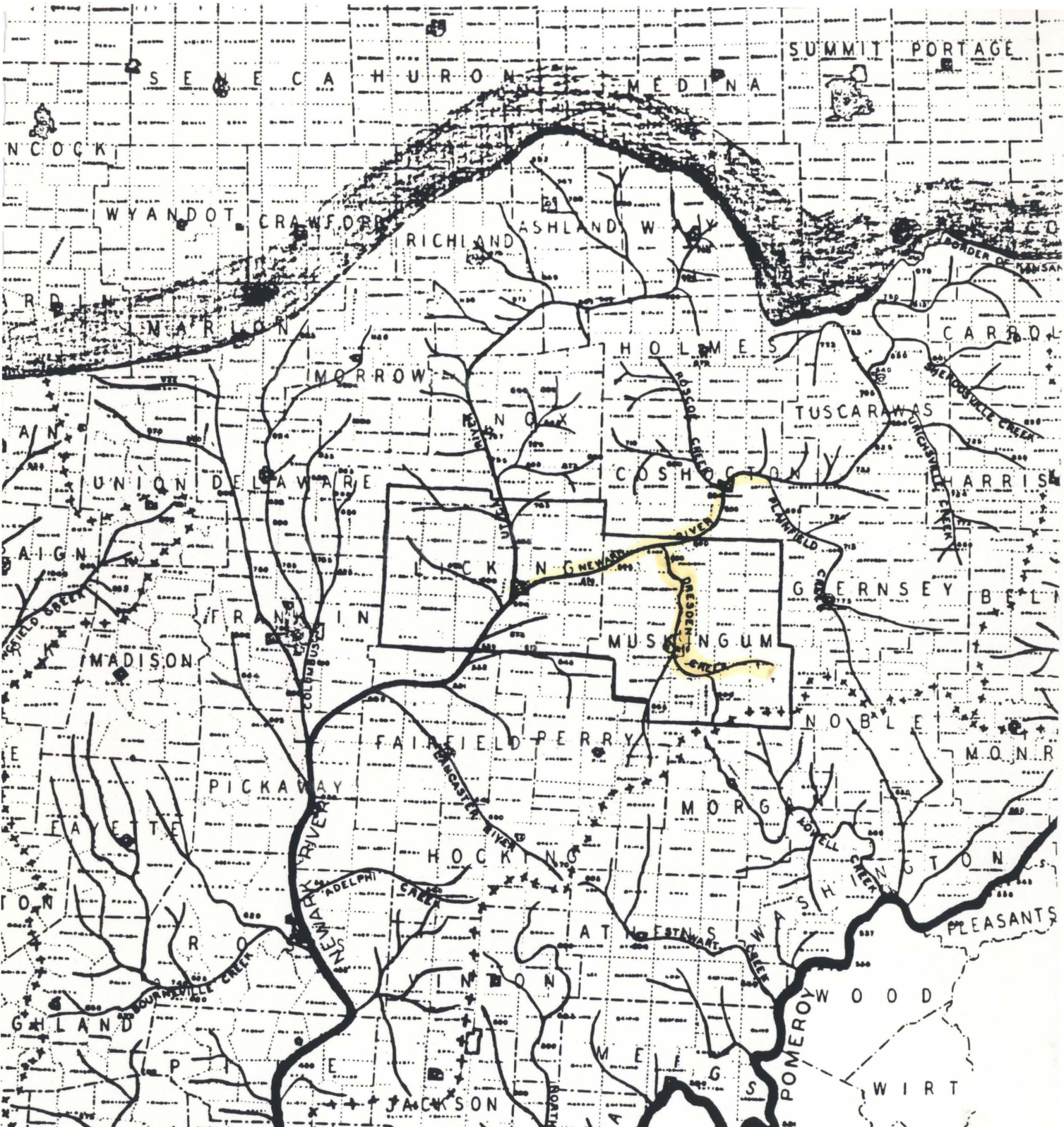

Figure 3. Deep Stage Drainage (Stout, et. al.,]943)

**********Drainage Divide**********

Creek. Dresden Creek had the same headwaters as Putnam Creek, but its lower waters travelled a northerly route up the present Muskingum River valley. Dresden Creek joined the Newark River at the town of Dresden.

The recession of the Kansan ice sheet allowed a regional uplift to take place. The resultant accelerated downcutting of the stream beds associated with this uplift characterized Deep Stage Drainage. The Illinoian ice sheet brought an end to the regional uplift that Ohio was experiencing and thus ended the Deep Stage period.

The Illinoian ice sheet influenced the drainage of Muskingum and Licking Counties to a much greater degree than the Kansan ice sheet before. Its influence was greater than that of the Wisconsin ice sheet to follow.

Post-Illinoian Stage

The extent of the Illinoian ice sheet which concerns this report was halted by a sandstone escarpment which lies just east of the city of Newark. Described as the "topographic expression of the resistant Mississippian and Pennsylvanian sandstones", this barrier contained the eastward flow of the ice sheet's Scioto lobe (Figure 4.) (Franklin, 1961.).

The Newark River was dammed by the Scioto lobe when that lobe reached the sandstone escarpment. Meltwater and glacial outwash flowed from the main body of ice into this new reservoir. The new reservoir allowed for the accumulation of lacustrine deposits.

As the ice sheet receded, a series of moraines were formed

Figure 4. Illinoian Stage Drainage (Stout, et. al.,1943)

**********Drainage Divide**********

at different points of the recession. The largest of these moraines was deposited just north of the town of Hanover, forming a natural dam which obstructed drainage (Figure 5.).

The Hanover dam arrested any hope of a restoration to the the area's preglacial drainage. The drainage turned eastward along the Newark Valley and southeastward along the Licking River Valley. The Licking River was a product of erosion that occured during the Illinoian glaciation. West of the Hanover dam, water and outwash continued to flow from the retreating ice forming a reservoir of water. This reservoir which we call Lake Licking (Tight, 1897) contained the melt waters of the Scioto lobe and the waters of the regional drainage (Figure 6.).

The waters of Lake Licking rose until they overflowed the top of a col in the Mississippian sandstone south of Hanover dam. These waters eroded the col into the present Licking Narrows (Blackhand Gorge) (Tight, 1897.). Through the narrows, the Licking River carried the drainage that collected in Lake Licking (Figure 7.). The waters flowed south through the Licking valley to Zanesville where it joined the Muskingum River on its course south to its confluence with the Ohio River.

The drainage of Muskingum and Licking Counties was thus highly affected by the Illinoian ice sheet. The Newark River Valley was filled with glacial outwash and lacustrine deposits. The waters of the Newark River and those of Lake Licking were shifted into the Licking River and carried east to the newly formed Muskingum River. Licking and Muskingum Counties new drainage system remained undisturbed until the Wisconsin ice sheet arrived.

Figure 5. Illinoian Outwash, Illinoian Stage Drainage

Figure 6. General Location of Lake Licking, Illinoian Stage Drainage

Figure 7. Erosion of Licking Narrows, Illinoian Stage Drainage

Wisconsin Stage and Post-Wisconsin Drainage

The Wisconsin time period produced Ohio's last ice sheet. While the Wisconsin ice sheet did not alter drainage in Muskingum and Licking Counties as the Illinoian and Kansan sheets had, the sheet left its mark in sizable depositions of sand and gravel.

The Wisconsin ice sheet stopped parallel yet short of the Illinoian sheet at Newark. The reservoirs of the Illinoian glaciation had lost their waters and their lacustrine deposits underwent normal dissection. Lake Licking collected the headwaters of the new Licking River. The Licking River flowed to a confluence with the newly formed Muskingum River at Zanesville (Figure 8.).

Into the Licking River's headwaters flowed the Wisconsin sand and gravel outwash. This outwash was carried through the narrows by the Licking River and deposited within the Licking valley east of the narrows. Two well-developed outwash levels were deposited, the Vanatta and the Utica terraces. (Jones, 1959.).

The Wisconsin ice was characterized by periods of recession and readvancement. The Vanatta outwash was laid first into the Licking River Valley in early late Wisconsin time. The valley deposits were dissected during a short recession of the ice. Outwash again filled the valley in late Wisconsin time. This new Utica outwash was likewise dissected after the final recession of the Wisconsin ice, leaving Vanatta and Utica outwash terraces at numerous locations along the Licking River Valley (Figure 9.).

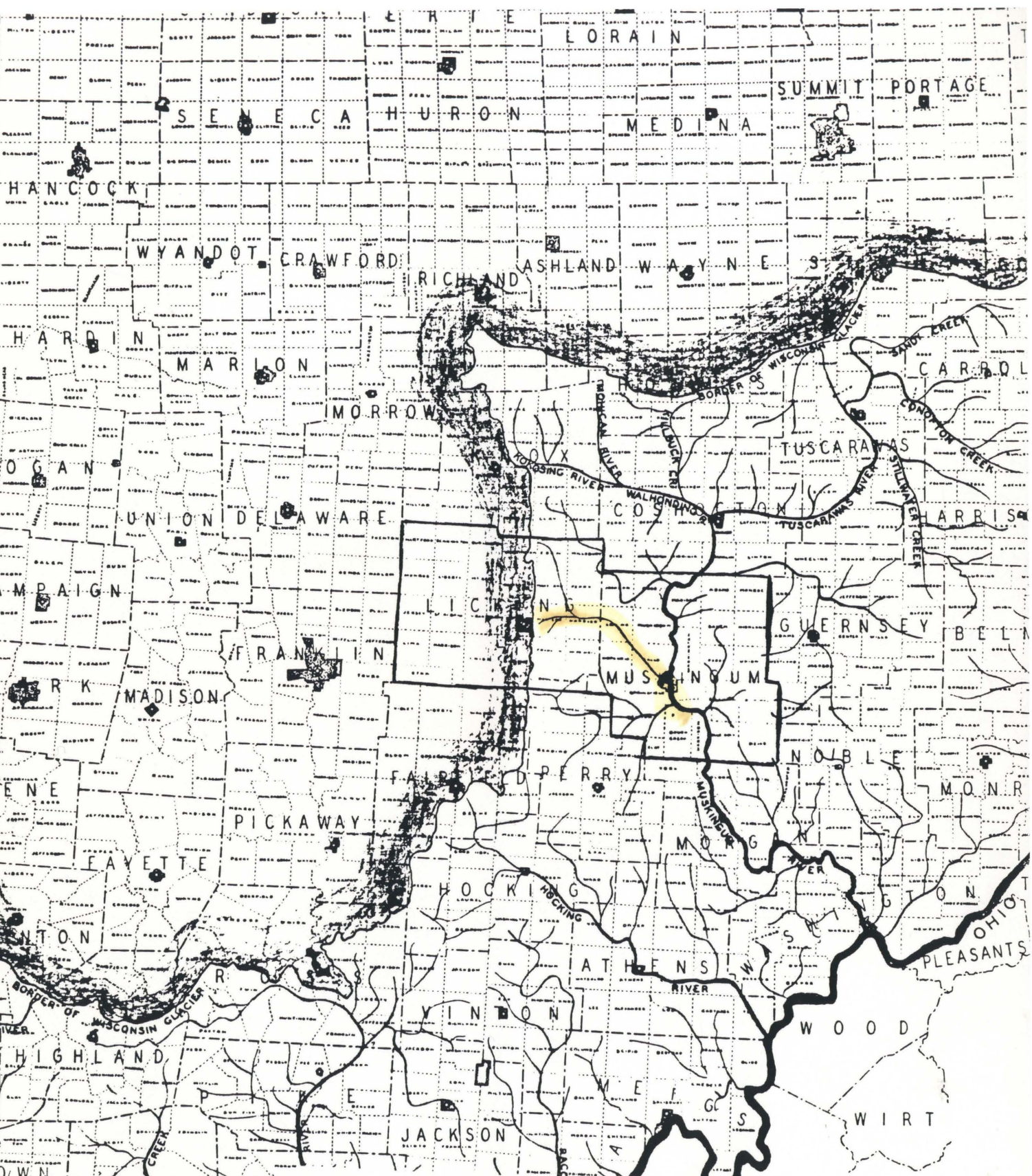

Figure 8. Wisconsin Stage Drainage (Stout, et. al.,1943)

Figure 9. Vanetta and Utica Outwash Terraces

Summary

Muskingum and Licking Counties owe their uniqueness to these great glaciations which have entered Ohio's borders. Changes in the drainage of the two Counties and changes in their topography via aggradation and degradation accompanied the appearances of the ice sheets.

The Cambridge River and the Putnam Creek drained the study area during Teays time. The Cambridge River was a major tributary to the Groveport and Teays Rivers and drained Muskingum and Licking Counties until the advent of the Kansan ice sheet.

The Kansan ice sheet brought the demise of the Teays River through glacial damming. The Newark River took over most of its drainage and flowed through the study area along the old Cambridge River Valley. Putnam Creek was pirated away into the newly formed Dresden Creek. The retreat of the Kansan ice sheet was followed by a regional uplift which inaugurated the Deep Stage drainage.

Deep Stage drainage within Muskingum and Licking Counties consisted of the Newark River and the Dresden Creek. These lines of drainage cut into the study area's surface until the arrival of the Illinoian ice sheet.

The Illinoian ice sheet halted the regional uplift that Ohio was experiencing and thus ended the Deep Stage period. It resulted in the damming of the Newark River at Hanover and the eroding of the Licking Narrows (Blackhand Gorge), producing today's south-flowing Licking River. This new drainage flowed freely until the appearance of the Wisconsin ice sheet.

The Wisconsin ice sheet was the last glatiation to invade Ohio. Wisconsin glaciation resulted in vast amounts amounts of outwash being deposited into the Licking River Valley. Subsequent erosion produced two well-developed terrace levels, the Vanatta and the Utica.

ACKNOWLEDGMENTS

I would like to thank Professor Russell Utgard for his encouragement and assistance with this senior thesis. Professor Richard Anderson was also extremely helpful in guiding me in my research. I would like to thank my parents for their support on this project and for their support during my education at The Ohio State University.

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